8-2011

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Original Publication Information

Pössel, Patrick and Kerstin Knopf. "Bridging the Gaps: An Attempt to Integrate Three Major Cognitive Depression Models." 2011. *Cognitive Therapy and Research*, 35:342 - 358.

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Bridging the gaps: An attempt to integrate three major cognitive depression models

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Abstract

There are obvious similarities between the cognitive constructs of Beck's cognitive theory, the hopelessness model, and the response styles theory. No single comprehensive model has yet integrated the core cognitive concepts of these theories, however. In order to develop such an integrative cognitive model, we conducted two independent studies with 588 and 606 participants, respectively, from a university population. Both studies support the idea that all cognitive constructs of the three models are distinct from each other. Furthermore, both studies provide evidence for the possibility an integration of the constructs in one cognitive model. If future studies replicate these findings, the integrated cognitive model can provide a theoretical framework to better understand how therapeutic techniques derived from one model influence cognitive variables from another model. This might even allow for improvements in the effectiveness of psychotherapies by theory-driven combinations of therapeutic techniques that are based on different models.

Keywords: depression; cognitive theory; hopelessness model; response styles theory; vulnerability factors.

Over the past several decades, three major cognitive theories to explain the development and maintenance of depression have been developed, empirically tested, and gained widespread popularity: Beck's cognitive theory (Beck, 1976), the hopelessness model (Abramson, Alloy, & Metalsky, 1989), and the response styles theory (Nolen-Hoeksema, Girus, & Seligman, 1992). These models are of particular importance for different reasons: First, they help us to explain epidemiological data (e.g., sex difference in depression rates; Nolen-Hoeksema et al., 1992). Second, they provide a theoretical basis for mechanisms underlying the development and maintenance of depression. Finally, some of the most effective interventions for depression have been developed based on these models (Abramson et al., 1989; Beck, 1976, Ramel, Gordon, Carmona, & McQuaid, 2004).

Similarities between these models are obvious and have been pointed out by the authors of the models themselves (e.g., Nolen-Hoeksema, 1991). One of the most apparent similarities between the three cognitive models is their classification as cognitive vulnerability-stress models. This implies that the interactions between cognitive vulnerabilities and activating negative events are used to explain why some individuals develop depression whereas others do not show this psychopathology. Beyond this relatively crude classification, other obvious theoretical similarities exist between the cognitive constructs of these theories that will be described in detail below after a short introduction to the different cognitive models (see *Distinguishability of the constructs in the three cognitive models*). These similarities raise the question whether cognitive constructs of all three models can be integrated into one cognitive approach. Consistent with that it is unlikely that the three cognitive theories are presenting entirely distinct etiological pathways, leading to the development of depression. Thus, "the richest examination of the cognitive theories will involve the integration of the various cognitive

constructs into one integrated model" (Abela & Scheffler, 2008, pg. 335). The development of an integrated cognitive model is not only important from an academic point of view, but also for clinical applications, as many intervention studies already attempt to use techniques from one cognitive model to change cognitive constructs proposed by another cognitive models without a theoretical justification. A recent example is an intervention that teaches techniques based "largely on Beck's and colleagues' cognitive therapy for depression", but predicts that these interventions would lead to a more optimistic inference style (hopelessness model) and that the inference style would causally mediate the effects of this intervention on depressive symptoms (Seligman, Schulman, & Tryon, 2007, pg. 1115). The development of an integrative cognitive model would allow us to go beyond using techniques and concepts based on different individual cognitive models or a collection of isolated features of such individual models. Moreover, such a model would allow us to better understand how different techniques influence cognitive variables and how concepts from various cognitive models interact. Beyond these theoretical advancements, an integrative model might lead to improvement in the effectiveness of psychotherapies for depression by allowing a theory-driven optimized combination of therapeutic techniques that are based on different models.

In order to develop such an integrative model, we used a two-tier approach: the first step was to investigate empirically if the cognitive constructs of the different models are distinct from each other. After this, we tested whether and how the cognitive constructs of all different models can be integrated into one comprising model.

The cognitive models can be interpreted as sequential pathway models, which organize the cognitive constructs of each model based on their sequential relationships to the onset of depressive symptoms (Alloy, Clements, & Kolden, 1985). Whereas distal constructs can be

defined as relatively early factors in the trajectory leading to the development of depressive symptoms, proximal constructs are placed later in this sequence. In addition, the sequential pathway model implies that each cognitive construct causally mediates the relationship between its preceding and subsequent construct completely (Alloy et al., 1985).

Beck's Cognitive Model

In Beck's cognitive model (1976), schemata, cognitive errors, cognitive triad, and automatic thoughts are central to the development and maintenance of depression. Schemata are relatively enduring, organizing structures that guide situational information processing. Depressogenic schemata are negative in content and consist of immature, absolute, and rigid attitudes about the self and its relation to the world. When activated by stress, depressogenic schemata lead to cognitive errors, the next step in the causal pathway to depression. Cognitive errors cause our perception and thinking to be unrealistic, extreme, and distorted in a negative way. As a result, cognitions are dominated by a negative view of the self, the world, and the future—the so-called cognitive triad. Following Beck (1976), the cognitive triad finds its expression in negative automatic thoughts. Automatic thoughts are understood as temporary, non-emotional mental events, which are subjectively plausible in a certain situation (Beck, 1976). These automatic thoughts can be interpreted as the most proximal cause for the emotional, somatic, and motivational symptoms of depression. It needs to be mentioned that empirical studies found the constructs in Beck's theory to only partially mediate the relationship between their preceding and subsequent constructs (Kwon & Oei, 1992; Pössel, 2010a; Stewart et al., 2004). In other words, contrary to the sequential interpretation of Beck's theory, each construct in his cognitive theory is directly associated with each other.

Hopelessness Model

The hopelessness model (Abramson et al., 1989) features inference style as the distal and hopelessness as the proximal cause of depression. Inference style is described as the tendency to make negative inferences about (1) the stability and (2) globality of causes of negative events, (3) the consequences of negative events, and (4) characteristics of the self following negative events. When an individual infers a negative event in this way, he or she develops the expectation of helplessness, which we can interpret as the proximal cause for the symptoms of depression. Moreover, (5) the additional internal attribution of negative events is thought to lead to low self-esteem.

Response Style Theory

The response styles theory proposes that the way an individual responds to a depressed mood is the central factor determining the development, severity, and duration of a depressive episode (Nolen-Hoeksema & Morrow, 1991). Individuals who respond to their depressed moods by repetitively focusing their attention on their symptoms and their implications demonstrate a so-called ruminative response style. This ruminative process is thought to lead to a worsening of the depressed mood. A recent factor analytic study revealed that a ruminative response style can be separated into depression-related rumination, reflection, and brooding (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). Treynor and colleagues demonstrated that depression-related rumination can be seen more as a symptom than as a risk factor of depressive symptoms. Reflection, the part of rumination that indicates the tendency to contemplate and reflect, as well as brooding, a tendency toward melancholic pondering, on the other hand, seem distinguishable from depressive symptoms.

Distinguishability of Constructs in the Three Cognitive Models

While the sequential pathway model (Alloy et al., 1985) provides a framework how to organize cognitive constructs that are distinguishable, it does not provide any support with the question if cognitive construct from different cognitive models are distinguishable from each other. Previous studies, however, provide some ideas with regard to this first purpose of our studies, the investigation whether the cognitive constructs of the different models are distinct from each other (distinguishable concepts vs. integrated concept). Other research provides information about the goal of our studies to test whether and how the cognitive constructs of all different models can be integrated in one model.

So far, only one recent publication has investigated the relationship between cognitive core variables of all three models (Hankin, Lakdawalla, Latchis Carter, Abela, & Adams, 2007). This study examined the correlations between depressogenic schemata, negative inference style (inferences to stability, globality, consequences, self), and rumination with two independent factor analytic studies. The research confirmed three distinguishable but nevertheless correlated cognitive constructs in a college student population.

Several other factor analytical studies with adult populations investigated the relationship between some cognitive constructs of Beck's cognitive theory and the hopelessness model (Joiner & Rudd, 1996; Neimeyer & Feixas, 1992; Reno & Halaris, 1989; Spangler, Simons, Monroe, & Thase, 1997). Joiner and Rudd (1996) investigated the relationship between negative inferences of causes (internal, stable, global) and depressogenic schemata in two studies with independent student samples. In their exploratory and confirmatory factor analyses all three variables (dysfunctional attitude, inferences of causes dimension internal/external, and depressive symptoms) formed their own factor while the inferences of the causes dimensions

stable/unstable and global/specific constitute a combined factor. These results support depressogenic schemata and inferences as distinguishable constructs.

Although the factor analytical studies reported so far support the independence of the cognitive constructs, Neimeyer and Feixas (1992) reported some common variance in their exploratory factor analysis with depressed outpatients. They found that negative inferences about causes (internal, stable, global) and cognitive errors load on the same factor while two instruments to measure depressive symptoms load on another factor. Consistent with this result, Leung and Wong's (1998) suggest that negative inferences about causes are a specific form of cognitive error (i.e., internal attribution = personalizing). Thus, it can be speculated that inference style and cognitive errors might describe the same underlying construct. If this is true, an integrated cognitive model treating inferences and cognitive errors as one factor should fit the data better than a model that treats both cognitive constructs as distinguishable. However, an alternative explanation for Neimeyer and Feixas' (1992) findings is based on the sequential pathway model, which assumes that inference style and cognitive errors are constructs relatively distal to depressive symptoms.

Similarly, the sequential pathway model can provide an explanation for Reno and Halaris' (1989) findings. These authors investigated the relationship between depressogenic schemata, negative inferences about causes (internal, stable, global), cognitive errors, and automatic thoughts in an exploratory factor analysis with depressed patients. In this study, all cognitive constructs but automatic thoughts formed one common factor. In the sequential pathway model depressogenic schemata, negative inferences, and cognitive errors are in closer proximity to each other than automatic thoughts. Once again, the sequential pathway model provides an explanation why these variables loaded on a single factor in Reno and Halaris' study

that only included these four cognitive constructs. This interpretation is supported by studies using other methods than factor analyses. For example, inference style more consistently predicts depressive symptoms (Alloy et al., 1999; Haeffel et al., 2003) and daily negative cognitions (Hankin, Fraley, & Abela, 2005) than schemata. Thus, consistent with the sequential pathway model and empirical evidence it can be assumed that inference style, depressogenic schemata, and cognitive errors are distinguishable constructs. If the interpretation of Neimeyer and Feixas' (1992) and Reno and Halaris' (1989) results based on the sequential pathway model is correct, a study including constructs that fill the gap in the sequence (e.g., cognitive triad) should reveal the distinctiveness of the inference style.

Finally, an experimental design that manipulated schemata, thoughts, and emotions independently found that the manipulation of thoughts or emotions influenced both constructs, making them indistinguishable from each other (Pössel & Knopf, 2008). Thus, automatic thoughts might be interpreted more as symptoms than as risk factor of depression. In order to test for this possibility, empirical research aiming for the development of an integrated cognitive model needs to include depressive symptoms.

Associations of Cognitive Constructs in an Integrated Cognitive Model

The majority of studies testing if and how the cognitive constructs of the different cognitive models can be integrated come from some of the authors of the original theories. Metalsky, one of the authors of the hopelessness model, proposes that Abramson et al.'s concept of hopelessness (1989) and Beck's (1976) negative view of the future as part of the cognitive triad can be seen as the same construct (Metalksy & Joiner, 1992). This notion is shared by Spangler et al. (1997). Contrary to the prediction of the hopelessness model, Metalsky and Joiner (1992) found hopelessness to be only partially temporally mediated by the association between

inference style and depressive symptoms in a longitudinal study. Therefore, the authors suggest that not hopelessness but all three parts of Beck's cognitive triad are mediators for this association. Based on this assumption, hopelessness (negative view of the future) will be compared with the cognitive triad as statistical mediator between inference style and depressive symptoms in our study.

Spasojević and Alloy (2001) demonstrated in a study with undergraduate students that rumination completely temporally mediates the relationship of depressogenic schemata and negative inference style (inferences to stability, globality, consequences, self) with depressive symptoms. Smith and Alloy (2009) assume that ruminative response style can be understood as repetitive process while negative automatic thoughts as Beck (1976) described them represent the content of thinking. Nolen-Hoeksema (1991, 2004) further specifies the relationship between rumination and negative automatic thoughts. She emphasizes that a ruminative response style focuses the attention of an individual and negative automatic thoughts may arise as result of this style of thinking. If this is the case, rumination should effect negative automatic thoughts that lead to the increase of depressive symptoms.

A recent longitudinal study tested the associations between Beck's constructs (1976) measured as one latent variable and the two ruminative response styles brooding and reflection (Pössel, 2010b). This study found that that Beck's constructs influence brooding while the elimination of reflection increased the model fit. In addition, a study testing the associations of inference style and the two ruminative response styles brooding and reflection revealed that brooding partially mediates the relationship between inference style and depressive symptoms (Lo, Ho, & Hollon, 2008). Reflection, however, does not function as statistical mediator because it shows only low associations with inference style and depressive symptoms. Thus, we

hypothesize that brooding will be influenced by the cognitive triad and inference style but not by automatic thoughts. The associations of reflection, on the other hand, might be difficult to address due to low or even no associations with depression and other cognitive constructs. Furthermore, reflection might not be a part of an integrated cognitive model at all.

Current Studies

The first step to develop an integrated cognitive model is to test if the cognitive constructs of the different models are distinct from each other. Based on the majority of empirical studies, we hypothesize that all discussed cognitive constructs in the three cognitive models are distinguishable from each other and from depressive symptoms. Nevertheless, some studies support the idea that some constructs are not distinguishable (Neimeyer & Feixas, 1992; Pössel & Knopf, 2008; Reno & Halaris, 1989). Thus, models with cognitive errors, inference style, and depressogenic schemata as separated constructs versus models treating them as one construct are compared. Similar, models treating automatic thoughts and depressive symptoms as separated versus one construct are compared.

The second purpose of our studies is to test whether the cognitive constructs of all different models can be integrated in one model. Thus, a model separating the cognitive constructs by the three original cognitive models was compared with different models integrating the original cognitive models. Based on empirical evidence (Metalksy & Joiner, 1992; Spangler et al., 1997) that not only hopelessness (negative view of the future) but all three parts of the cognitive triad mediate the relationship between inference style and depressive symptoms, models using hopelessness and cognitive triad as statistical mediators are compared. While the associations of most cognitive constructs seem defined, the relations of inference style with depressogenic schemata and cognitive errors are still unclear. Therefore, the integrating models

differ partially with respect to the associations of inference style. It is predicted that the cognitive triad will be influenced by inference style. In addition, it is proposed that brooding is effected by cognitive triad and inference style and influences automatic thoughts. Due to low correlations of reflection with all other cognitive constructs and depressive symptoms, it is predicted that reflection will not be a part of the integrated cognitive model at all. As empirical studies suggest partial mediation between different constructs of the same and different models (Kwon & Oei, 1992; Lo et al., 2008; Metalksy & Joiner, 1992; Pössel, 2010a; Stewart et al., 2004), full and partial mediation models will be compared.

STUDY 1

Method

Participants and Procedures

The sample for Study 1 was derived from 588 psychology students (507 females, 81 males) at a university in southwest Germany. Their ages ranged from 18 to 52 years with a mean of 23.27 years and a standard deviation of 7.11 years. Of the participating students, 115 (19.6%) reported clinically significant depressive symptoms in a self-report measure. In groups of 8 to 15, participants completed a questionnaire battery including a measure of depression and various instruments to investigate cognitive constructs. The order of the questionnaires was counterbalanced across the sample following the Latin Square design. Informed consent was obtained from all participants; they also received course credits for their participation.

Measures

Center for Epidemiological Studies – Depression Scale (CES – D): The CES-D (Radloff, 1977; German version: Hautzinger & Bailer, 1993) consists of 20 items and was developed to be a quickly administered, economical screening instrument able to measure depressive symptoms

based on self-report. The frequency of symptoms is rated on a four-point scale, with higher numbers indicating a higher frequency of occurrence. Following the German norming sample, a score of ≥ 23 represents clinically significant depressive symptoms (Hautzinger & Bailer, 1993).

Dysfunctional Attitudes Scale (DAS): The DAS Form A (Weissman & Beck, 1978; German version: Hautzinger, Joormann, & Keller, 2005) consists of 40 7-point Likert items that measure depressogenic schemata, a cognitive construct described by Beck (1976). Based on the factor analyses conducted by Cane, Olinger, Gotlib, and Kuiper (1986), the DAS scale was divided into the subscales *performance evaluation* and *approval by others*. This factor structure was replicated with the German version of the DAS (Joormann, 2004). In this sample, only the items loading on one of the two factors were administered. Higher scores in each subscale represent greater endorsement of depressogenic schemata.

Cognitive Error Questionnaire (CEQ): The CEQ (Lefebvre, 1981; German version: Pössel, 2009a) consists of 24 5-point Likert items that measure cognitive errors, a cognitive construct described by Beck (1976). The German CEQ includes the subscales *catastrophizing*, *overgeneralization*, *personalization*, and *selective abstraction* as well as a second order factor (Pössel, 2009a). Thus, all item values are added up to a total score, with higher scores representing greater endorsement of cognitive errors.

Cognitive Triad Instrument (CTI): The CTI (Beckham, Leber, Watkins, Boyer, & Cook, 1986; German version: Pössel, 2009b) consists of 36 7-point Likert items to measure the cognitive triad [*view of the self* (10 items), *the world* (10 items), and *the future* (10 items)], a cognitive construct described by Beck (1976). The remaining six items are filler items that are not scored. The items are phrased in both positive and negative direction. While Anderson and Skidmore (1995) revealed a 5-factor structure and McIntosh and Fischer (2000) found only one

factor for the original CTI, the German evaluation revealed a 6-factor structure comprising not only scales to measure view of self, view of world, and view of future, but also separating each of these scales into negatively and positively worded items (Pössel, 2009b). The negative scales correlated higher with concurrent and predicted depressive symptoms than the positive scales (Pössel, 2009b). Before calculating the scores for the CTI by summing, all items are pooled so that higher scores represent positive views and lower scores represent negative views.

Automatic Thoughts Questionnaire-Revised (ATQ-R): The ATQ-R (Kendall, Howard, & Hays, 1989; German version: Pössel, Seemann, & Hautzinger, 2005) measures automatic thoughts as described by Beck (1976). The German ATQ-R includes the subscales *negative self-statements* (12 items), *well-being* (5 items), and *self-confidence* (4 items) and consists of 21 5-point items. A higher summary score in the subscale *negative self-statements* indicates more negative automatic thoughts, whereas higher scores in the subscales *well-being* and *self-confidence* indicate more positive automatic thoughts. In this sample, only the negative self-statements scale was administered.

Cognitive Style Questionnaire (CSQ): The CSQ (Haeffel et al., 2008; German version: Pössel, 2010c) measures inferences about causes, consequences, and self in relation to negative events as described by Abramson et al. (1989). The CSQ consists of 24 hypothetical event scenarios—12 negative and 12 positive (including 6 interpersonal and 6 achievement scenarios each). Only the negative event scenarios were used in this study.

In the CSQ, respondents are presented with a hypothetical event and asked to write down one cause for the event. Respondents then rate the degree to which the cause of the hypothetical event was (a) internal, (b) stable, and (c) global (negative inferences for causal attributions). Next, they rate the likelihood that further negative consequences will result from the event

(negative inferences of consequences). Finally, they rate the degree to which the occurrence of the event means that the self is flawed (negative inferences of the self). Each rating uses a 7-point Likert scale, with higher scores representing a more depressive inference style.

Response Styles Questionnaire (RSQ): The German version of the Rumination Response Subscale (RRS) of the RSQ (Nolen-Hoeksema & Morrow, 1991; German version: Bürger & Kühner, 2007) consists of 18 4-point Likert items that measure how often a participant engages in various behaviors in response to a depressed mood. Based on the factor analyses conducted by Treynor et al. (2003), the RRS was divided into the subscales *depression-related*, *reflection*, and *brooding*. Higher scores in each subscale represent more engagement in certain behaviors.

Data Analysis

As in Hankin et al.'s (2007) study, CFA with the maximum likelihood method were conducted using AMOS 18.0 to calculate structural equation models (Arbuckle, 1999). Goodness of fit of the CFA was tested with χ^2. However, as χ^2 is known to increase with sample size and degrees of freedom, the χ^2 is complemented by using χ^2/df, root mean squared of the residuals (RMSEA; Steiger & Lind, 1980), and the comparative fit index (CFI; Bentler, 1990) as well. Furthermore, Akaike Information Criterion (AIC; Akaike, 1974) and χ^2 difference tests are calculated to compare the models.

While a full explanation of these indices and their limitations is beyond the scope of this article, a short description seems necessary: Statistically nonsignificant values of χ^2 indicate a good fit of the model to the data. A RMSEA value of .00 indicates a perfect model fit; a value of $\leq .05$ is conventionally regarded as an indicator of a good model fit; and a value of $\leq .08$ is seen as acceptable (Hu & Bentler, 1999). CFI values of $\geq .95$ indicate a good model fit and values of $\geq .90$ are regarded as acceptable (Hu & Bentler, 1999). Finally, AIC is a measure of parsimony

that adjusts model chi-square to penalize for model complexity. AIC reflects the discrepancy between model-implied and observed covariance matrices. Comparing two models, the lower AIC reflects the model with the better fit to the data (Akaike, 1974) with 0-2 as substantial support, 4-7 as weak support, and > 10 essential none support for equivalency of both models (Burnham & Anderson, 2002). In addition, nested models are compared by subtracting the χ^2 values as well as the *df*s of the models from each other (χ^2 difference tests). When $\Delta\chi^2$ is significant for Δdf, the models are seen as significantly different from each other.

As the goal of Study 1 was to examine the nature of a set of constructs, the CFA's were calculated with item parcels based on existing subscales (Little, Cunningham, Shahar, & Widaman, 2002). A CFA requires at least two observable variables loading on one latent variable. Therefore, when earlier studies did not establish subscales (ATQ, RSQ brooding, RSQ reflection) the observed variables were used to estimate the construct of interest in the CFA.

Results

Descriptive data, internal consistency, and correlations for all instruments applied in Study 1 are presented in Table I. Almost all measures were moderately correlated with each other. Only the RSQ scale reflection did not correlate with many other instruments to measure cognitive constructs and the CES-D.

Tests for Distinctiveness of Cognitive Constructs

To test whether the cognitive constructs of the different models are distinct from each other, a measurement model treating all constructs as different was calculated, χ^2 (210, N = 588) = 1128.24, $p < .001$, $\chi^2/df = 4.29$, CFI (.881), RMSEA (.075), AIC (1943.29). This model was compared with alternative measurement models treating inference style and depressogenic schemata, χ^2 (219, N = 588) = 1099.48, $p < .001$, $\chi^2/df = 5.02$, CFI (.848), RMSEA (.083), AIC

(1309.48), cognitive errors, χ^2 (219, N = 588) = 1293.58, $p < .001$, χ^2/df = 5.91, CFI (.815), RMSEA (.091), AIC (1503.58), and depressogenic schemata and cognitive errors, χ^2 (227, N = 588) = 1400.75, $p < .001$, χ^2/df = 6.17, CFI (.798), RMSEA (.094), AIC (1594.75), as well as automatic thoughts and depressive symptoms as one construct, χ^2 (218, N = 588) = 948.39, $p < .001$, χ^2/df = 4.35, CFI (.874), RMSEA (.076), AIC (1160.39). The $\Delta\chi^2$ difference tests revealed that the model treating cognitive constructs of the different models as distinct from each other fits the data significantly better than the models treating inference style and depressogenic schemata, $\Delta\chi^2$ (9, N = 588) = 199.24, $p < .001$, cognitive errors, $\Delta\chi^2$ (9, N = 588) = 393.34, $p < .001$, and depressogenic schemata and cognitive errors, $\Delta\chi^2$ (17, N = 588) = 500.51, $p < .001$, as well as automatic thoughts and depressive symptoms as one construct, $\Delta\chi^2$ (8, N = 588) = 48.15, $p < .001$.

To improve the measurement model, two additional alternative models were tested based on previous literature. First, based on recent empirical studies (Lo et al., 2008; Pössel, 2010b) and the low correlations of the response style reflection with the other constructs measured in Study 1, the measurement model was compared with a model without reflection, χ^2 (196, N = 588) = 856.14, $p < .001$, χ^2/df = 4.37, CFI (.883), RMSEA (.076), AIC (1062.14). This comparison confirmed that the original measurement model fit the data better than the model without reflection, $\Delta\chi^2$ (14, N = 588) = 44.10, $p < .001$.

Second, considering the unstable factor structure of the CTI, highlighted by the fact that three different factor structures were found in the only three empirical studies researching the factor structure of the CTI (Anderson & Skidmore, 1995; McIntosh & Fischer, 2000; Pössel, 2009b), the six CTI scales found in the German evaluation study of the CTI were treated as distinguishable constructs. This improved not only the goodness-of-fit and parsimony of the

measurement model, χ^2 (183, N = 588) = 686.62, $p < .001$, χ^2/df = 3.75, CFI (.913), RMSEA (.068), AIC (968.62), but this model fits the data even better than the original measurement model, $\Delta\chi^2$ (27, N = 588) = 213.62, $p < .001$. Further, based on the lower correlations of the positive CTI scales with depressive symptoms and the other constructs measured in Study 1 as well as the German evaluation study (Pössel, 2009b), the measurement model with six CTI scales was compared with a model without the positive CTI scales, χ^2 (150, N = 588) = 499.34, $p < .001$, χ^2/df = 3.33, CFI (.930), RMSEA (.063), AIC (703.34). All indices of goodness of fit and parsimony as well as the $\Delta\chi^2$ difference test revealed that the measurement model without the positive CTI scales fit the data better than the model with six CTI scales, $\Delta\chi^2$ (33, N = 588) = 187.28, $p < .001$.

Tests for Mediations

The second purpose of our studies is to test whether the cognitive constructs of all different models can be integrated in one model. To do this, a repeated sequence of analytical steps was followed. Full and partial mediation models for two proposed models were calculated and compared first, followed by comparing the better fitting models of each of the two proposed models with each other. Then, full and partial mediation models for the next proposed model were calculated and compared with the best fitting model of the previous comparisons. Thus, each tested model based on the results of the previously tested model and is identical to this model in all associations besides the specified relationships.

Following this strategy, a model separating the cognitive constructs of the three original cognitive models without positive CTI scales and allowing only for full mediation, χ^2 (180, N = 588) = 1512.62, $p < .001$, χ^2/df = 8.40, CFI (.734), RMSEA (.112), AIC (1656.62), was compared with a similar model but allowing for partial mediation, χ^2 (169, N = 588) = 961.14, p

< .001, χ^2/df = 5.69, CFI (.842), RMSEA (.089), AIC (1127.14). The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (11, N = 588) = 551.48, p < .001.

Following Nolen-Hoeksema (1991, 2004), Smith and Alloy (2009) and Spasojević and Alloy (2001), models in which automatic thoughts mediate the association of brooding and reflection with depressive symptoms fully, χ^2 (169, N = 588) = 958.64, p < .001, χ^2/df = 5.67, CFI (.842), RMSEA (.089), AIC (1124.64), and partially, χ^2 (167, N = 588) = 953.38, p < .001, χ^2/df = 5.71, CFI (.843), RMSEA (.090), AIC (1123.38) were computed and compared with each other. The $\Delta\chi^2$ difference test revealed that both models did not differ significantly, $\Delta\chi^2$ (2, N = 588) = 5.26, p = n.s.. Thus, the more parsimonious full mediation model was retained. The partial mediation model comparing constructs of all three original models separately was compared with the model in that automatic thoughts fully mediate the association of brooding and reflection with depressive symptoms. The difference between the AICs (3.75) showed only weak support for equivalency. Thus, the model with automatic thoughts fully mediating the association of brooding and reflection with depressive symptoms was retained.

Next, models in which brooding and reflection fully mediate the associations of the three negative scales of the CTI with automatic thoughts, χ^2 (169, N = 588) = 1297.23, p < .001, χ^2/df = 7.68, CFI (.775), RMSEA (.107), AIC (1463.23), and partially, χ^2 (163, N = 588) = 910.22, p < .001, χ^2/df = 5.58, CFI (.851), RMSEA (.088), AIC (1088.22) were computed. The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (6, N = 588) = 387.01, p < .001. Thus, the model with brooding and reflection partially mediating the associations of the three negative CTI scales with automatic thoughts was compared with the model in that brooding and reflection effect

automatic thoughts but do not mediate these association between CTI scales and automatic thoughts, $\Delta\chi^2$ (6, N = 588) = 48.42, $p < .001$. Therefore, the model with brooding and reflection partially mediating the associations of the three negative CTI scales with automatic thoughts was retained.

Based on Lo et al. (2008), models in which brooding and reflection fully, χ^2 (162, N = 588) = 868.74, $p < .001$, χ^2/df = 5.36, CFI (.859), RMSEA (.086), AIC (1048.74), and partially, χ^2 (161, N = 588) = 868.15, $p < .001$, χ^2/df = 5.39, CFI (.859), RMSEA (.087), AIC (1050.15), mediate the associations between inference style and depressive symptoms were calculated and compared, $\Delta\chi^2$ (1, N = 588) = 0.58, p = n.s.. Because both models did not differ significantly, the more parsimonious model with full mediation was retained. The mediation model with brooding and reflection fully mediating the association between inference style and depressive symptoms was compared with the model in that the response styles do not mediate this association using the AICs. The difference between AICs (48.49) showed essentially no support for equivalency. Thus, the full mediation model was retained.

Based on Metalsky and Joiner (1992) and Spangler et al. (1997), models in which all three negative CTI scales fully, χ^2 (162, N = 588) = 902.13, $p < .001$, χ^2/df = 5.57, CFI (.852), RMSEA (.088), AIC (1082.13), and partially, χ^2 (160, N = 588) = 852.44, $p < .001$, χ^2/df = 5.33, CFI (.862), RMSEA (.086), AIC (1036.44) mediate the associations between inference style and all more proximal were computed. The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (2, N = 588) = 49.69, $p < .001$. Further, the comparison between the model in which all three negative CTI scales partially mediate the associations between inference style and all more proximal constructs and the model in that only the negative view of future scale of the CTI partially

mediates these associations revealed that the latter model fits the data better, $\Delta\chi^2$ (2, N = 588) = 16.30, $p < .001$, and therefore was retained.

Next, the relations of inference style with dysfunctional attitudes and cognitive errors were studied. Thus, a model in which inference style fully mediates the associations between dysfunctional attitudes and cognitive errors with all other constructs in the model, χ^2 (168, N = 588) = 942.04, $p < .001$, χ^2/df = 5.61, CFI (.845), RMSEA (.089), AIC (1110.04), a model in that inference style fully mediates the associations between dysfunctional attitudes but not cognitive errors with all other constructs in the model, χ^2 (169, N = 588) = 1051.88, $p < .001$, χ^2/df = 6.22, CFI (.824), RMSEA (.094), AIC (1217.88), and a model in dysfunctional attitudes and cognitive errors fully mediate the associations between inference style with all other constructs in the model, χ^2 (163, N = 588) = 829.01, $p < .001$, χ^2/df = 5.09, CFI (.867), RMSEA (.083), AIC (1007.01), were calculated. Comparisons of the AICs of all mediation models showed essentially no support for equivalency between any of these models. Thus, the model in which dysfunctional attitudes and cognitive errors fully mediate the associations between inference style with all other constructs in the model which had the lowest AIC was retained. Because of the cross-sectional nature of the data, it was not possible to calculate similar models to test for partial mediation. Instead, a model in that inference style, dysfunctional attitudes, and cognitive errors correlate with each other was tested, χ^2 (158, N = 588) = 747.44, $p < .001$, χ^2/df = 4.73, CFI (.882), RMSEA (.080), AIC (935.44). A comparison of this model with the model in which dysfunctional attitudes and cognitive errors fully mediate the associations between inference style with all other constructs in the model demonstrated that the first model fit the data better than the full mediation model, $\Delta\chi^2$ (5, N = 588) = 81.57, $p < .001$.

While this model fit the data better than any other tested model, the RMSEA was only acceptable and the CFI was not acceptable. Therefore, associations that are not meaningful were identified using a cutoff of $p = .20$ (Burkholder & Harlow, 2003; Hosmer & Lemeshow, 1989). The inspection of the model revealed that the associations of automatic thoughts and reflection and the CTI scale negative view of world with brooding and reflection were not meaningful. The step-wise elimination of the association of automatic thoughts with reflection, χ^2 (159, N = 588) = 748.08, $p < .001$, $\chi^2/df = 4.71$, CFI (.882), RMSEA (.079), AIC (934.08), and CTI scale negative view of world with brooding and reflection, χ^2 (161, N = 588) = 749.05, $p < .001$, χ^2/df = 4.65, CFI (.883), RMSEA (.079), AIC (931.05), lead to models that where all not significantly different from the previously described model but more parsimonious (without association of automatic thoughts with reflection, $\Delta\chi^2$ (1, N = 588) = 0.64, p = n.s.; CTI scale negative view of world with brooding and reflection, $\Delta\chi^2$ (3, N = 588) = 0.97, = n.s.). Therefore, while the goodness-of-fit and parsimony indices of the model without association between automatic thoughts and reflection, the CTI scale negative view of world and brooding and reflection, and inference and brooding did not fit the data better, this model was retained as final model of Study 1. The standardized parameter estimates of the final model are presented in Figure 1.

Discussion

Study 1 was designed to provide first evidence for a proposed integrated cognitive model. Thus, Study 1 has three main purposes; first, it was designed to evaluate whether the cognitive constructs of the different models are distinct from each other (Abramson et al., 1989; Beck, 1976; Nolen-Hoeksema & Morrow, 1991). Based on the majority of empirical studies, we hypothesize that all discussed cognitive constructs in the three cognitive models are distinguishable from each other and from depressive symptoms. The results of Study 1 provided

support for this hypothesis.The second purpose of Study 1 was to test whether and how the cognitive constructs of the three different models (Abramson et al., 1989; Beck, 1976; Nolen-Hoeksema & Morrow, 1991) can be integrated in one cognitive model. In addition, it was a purpose of Study 1 to evaluate whether the effects of constructs from different cognitive models are mediated fully or partially. While the final model of Study 1 supported the idea of an integrated model in general, not all hypotheses were confirmed. Thus, while all negative views of the self, world, and future are associated with the inference style as proposed, a negative view of the world was not associated with either response styles. In addition and as predicted, brooding is associated with inference style and automatic thoughts. However, contrary to the expectation reflection was associated with inference style as well. Similar, contrary to the predictions, the associations of inference style, brooding, and reflection with depressive symptoms are statistically fully mediated.

In addition, the analyses in Study 1 revealed that the scales of the CTI do not load on a common latent variable and that the positive CTI scales should not be included in the model. While the independence of the CTI scales could have been expected based on previous results about the factor structure of the CTI (Anderson & Skidmore, 1995; McIntosh & Fischer, 2000; Pössel, 2009b), it is somewhat unexpected that the elimination of the positive CTI scales improved the model fit. Thus, in Study 2 models with and without positive CTI scales will be compared.

Furthermore, because the final model of Study 1 in general and the elimination of the associations of automatic thoughts with reflection and CTI scale negative view of world with brooding and reflection in particular were solely empirically driven, it can be argued that the results of Study 1 may depend heavily on the sample characteristics. Therefore, different models

with and without these associations will be compared in Study 2 and the final model of Study 1 will be compared with theory-driven models to replicate the results of Study 1 with an independent sample.

STUDY 2

Method

Participants and Procedures

The sample for Study 2 was derived from 606 psychology students (450 females, 156 males) at a university in the Southwest of Germany. Their age ranged from 18 to 49 years with a mean of 24.13 years and a standard deviation of 5.97 years. Of the participating students, 114 (18.8%) reported clinically significant depressive symptoms in a self-report measure. During the spring semester, participants completed a questionnaires battery online that included a depression questionnaire and various instruments to measure cognitive constructs. The order of the questionnaires was counterbalanced across the sample following the Latin Square design. Informed consent was obtained from all participants, and all participants were included in three prize drawings of 100 EURO for their participation in this study.

Measures

The measures used in Study 2 are identical to those used in Study 1 (see above).

Data Analysis

The statistical procedures utilized in Study 2 are identical to those used in Study 1 (see above).

Results

Descriptive data, internal consistency, and correlations for all instruments used in Study 2 are presented in Table II. Almost all measures were moderately correlated with each other. As

expected, the RSQ scale reflection was the only exception and did not correlate with many of the other instruments to measure cognitive constructs.

Test of Empirically Gained Improvements

The final model of Study 1, χ^2 (162, N = 606) = 714.45, $p < .001$, $\chi^2/df = 4.41$, CFI (.891), RMSEA (.075), AIC (894.45) was fit to the data of Study 2, resulting in similar values of the goodness-of-fit and parsimony indices as in Study 1. Thus, this model was compared to the same model including the positive CTI scales, χ^2 (196, N = 606) = 825.30, $p < .001$, $\chi^2/df = 4.21$, CFI (.894), RMSEA (.073), AIC (1081.30). Replicating the result from Study 1, the former model fits the data better than the model including positive CTI scales, $\Delta\chi^2$ (34, N = 606) = 110.85, $p < .001$.

Next, the final model of Study 1 was compared to a model with associations of the CTI scale negative view of the world with both response styles, χ^2 (160, N = 606) = 711.41, $p < .001$, $\chi^2/df = 4.45$, CFI (.891), RMSEA (.075), AIC (895.41), and a model with associations of the CTI scale negative view of the world with brooding and reflection and automatic thoughts with reflection, χ^2 (159, N = 606) = 710.29, $p < .001$, $\chi^2/df = 4.47$, CFI (.841), RMSEA (.076), AIC (896.29). Again replicating Study 1, both comparisons revealed that the final model of Study 1 did not differ significantly from the model with associations of the CTI scale negative view of the world with both response styles, $\Delta\chi^2$ (2, N = 606) = 1.12, p = n.s., or the model with associations of the CTI scale negative view of the world with brooding and reflection and automatic thoughts with reflection, $\Delta\chi^2$ (3, N = 606) = 4.15, p = n.s.. Thus, the final model of Study 1 as the more parsimonious model was retained.

Comparisons to Theory-Driven Models

To replicate the results of Study 1, the same repeated sequence of analytical steps as in Study 1 was used but with the final model of Study 1 as starting point. Thus, a model separating the cognitive constructs of the three original cognitive models without positive CTI scales and allowing only for full mediation, χ^2 (180, N = 606) = 1317.59, $p < .001$, χ^2/df = 7.32, CFI (.775), RMSEA (.102), AIC (1461.59), was compared with a similar model but allowing for partial mediation, χ^2 (170, N = 606) = 824.06, $p < .001$, χ^2/df = 4.85, CFI (.870), RMSEA (.080), AIC (988.06). The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (10, N = 606) = 493.53, $p < .001$. Finally, comparing the AICs of the partial mediation model with the final model of Study 1 found essentially no support for equivalency (difference between AICs: 93.61), replicating Study 1.

After this, models in which automatic thoughts mediate the association of brooding with depressive symptoms fully, χ^2 (171, N = 606) = 814.62, $p < .001$, χ^2/df = 4.76, CFI (.872), RMSEA (.079), AIC (976.62), and partially, χ^2 (169, N = 606) = 812.47, $p < .001$, χ^2/df = 4.81, CFI (.873), RMSEA (.079), AIC (978.47) were computed and compared with each other. The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the full mediation model, $\Delta\chi^2$ (2, N = 606) = 2.14, p = n.s.. Thus, the more parsimonious full mediation model was compared with the final model of Study 1. The difference between both AICs (82.17) showed essentially no support for equivalency. Therefore, the final model of Study 1 was retained.

Models in which brooding and reflection mediate the associations of the CTI scales negative view of the self and the future with automatic thoughts fully, χ^2 (171, N = 606) = 1099.93, $p < .001$, χ^2/df = 6.43, CFI (.816), RMSEA (.095), AIC (1261.93), and partially, χ^2

(167, N = 606) = 794.59, $p < .001$, χ^2/df = 4.75, CFI (.876), RMSEA (.079), AIC (964.59) were computed. The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (4, N = 606) = 305.33, $p < .001$. Thus, the model in which brooding and reflection partially mediate the associations of the CTI scales negative view of the self and the future with automatic thoughts was compared with the final model of Study 1. The difference in AICs (70.15) revealed essentially no support for equivalency in favor of the final model of Study 1.

Next, models in which brooding and reflection fully, χ^2 (166, N = 606) = 762.88, $p < .001$, χ^2/df = 4.60, CFI (.882), RMSEA (.077), AIC (934.88), and partially, χ^2 (165, N = 606) = 761.41, $p < .001$, χ^2/df = 4.61, CFI (.882), RMSEA (.077), AIC (935.41), mediate the associations between inference style and depressive symptoms were calculated and compared, $\Delta\chi^2$ (1, N = 606) = 1.47, p = n.s.. Because both models did not differ significantly, the more parsimonious model with full mediation was retained and compared to the final model of Study 1, $\Delta\chi^2$ (4, N = 606) = 48.43, $p < .001$. Thus, the final model of Study 1 was retained.

Following, models in which all three negative CTI scales fully, χ^2 (166, N = 606) = 779.95, $p < .001$, χ^2/df = 4.70, CFI (.878), RMSEA (.078), AIC (951.95), and partially, χ^2 (164, N = 606) = 751.78, $p < .001$, χ^2/df = 4.58, CFI (.884), RMSEA (.077), AIC (927.78) mediate the associations between inference style and all more proximal were computed. The $\Delta\chi^2$ difference test revealed that the partial mediation model fits the data significantly better than the model with full mediation, $\Delta\chi^2$ (2, N = 606) = 28.18, $p < .001$. Further, the comparison between the model in which all three negative CTI scales partially mediate the associations between inference style and all more proximal and the final model of Study 1 revealed that the latter model fits the data significantly better, $\Delta\chi^2$ (2, N = 606) = 37.33, $p < .001$, and therefore it was retained.

Finally, a model in which inference style fully mediates the associations between dysfunctional attitudes and cognitive errors with all other constructs in the model, χ^2 (172, N = 606) = 929.10, $p < .001$, χ^2/df = 5.40, CFI (.850), RMSEA (.085), AIC (1089.10), a model in that inference style fully mediates the associations between dysfunctional attitudes but not cognitive errors with all other constructs in the model, χ^2 (173, N = 606) = 1019.20, $p < .001$, χ^2/df = 5.89, CFI (.832), RMSEA (.090), AIC (1177.20), and a model in which dysfunctional attitudes and cognitive errors fully mediate the associations between inference style with all other constructs in the model, χ^2 (167, N = 606) = 777.90, $p < .001$, χ^2/df = 4.66, CFI (.879), RMSEA (.078), AIC (947.90), were calculated. Comparing the AICs of these not nested mediation models showed essentially no support for equivalency between any of these models. The model in which dysfunctional attitudes and cognitive errors fully mediate the associations between inference style with all other constructs in the model had the lowest AIC and was retained. Comparing this model with the final model of Study 1 revealed that the final model of Study 1 fit the data better than this model as well, $\Delta\chi^2$ (5, N = 606) = 63.45, $p < .001$. Thus, the results of Study 1 were completely replicated in Study 2 using an independent sample. Thus, the standardized parameter estimates of the final model are presented in Figure 2. Nevertheless, as in Study 1, while this model fit the data better than any other tested model, the RMSEA was only acceptable and the CFI was not acceptable.

General Discussion

Three major cognitive theories to explain the development and maintenance of depression have been developed, empirically tested, and gained widespread popularity: Beck's cognitive theory (Beck, 1976), the hopelessness model (Abramson, Alloy, & Metalsky, 1989), and the response styles theory (Nolen-Hoeksema, Girus, & Seligman, 1992). All three models

have significant similarities. Negative view of the future as part of Beck's cognitive model and hopelessness from the hopelessness model, for example, are strikingly similar (i.e., negative view of future and hopelessness). In addition, multiple empirical results revealed that the effects of cognitive constructs from one model are (statistically or temporally) mediated by constructs from another model (Metalsky & Joiner, 1992; Spasojević & Alloy, 2001). Thus, is seems logical to raise the questions whether cognitive constructs of all three theories can be integrated in one cognitive model. In order to develop such an integrated cognitive model, the first purpose of our studies was to investigate empirically if the cognitive constructs of the different models are distinct from each other. The second purpose of our studies was to test whether and how the cognitive constructs of all different models can be integrated into one comprising model.

Concerning the first purpose of the studies, inference style is distinguishable from depressogenic schemata and cognitive errors as described in Beck's (1976) cognitive model and both response styles are distinguishable from automatic thoughts. These results are consistent with our predictions and the majority of previous empirical studies (Alloy et al., 1999; Haeffel et al., 2003; Hankin et al., 2007; Joiner & Rudd, 1996; Spangler et al., 1997).

To test whether and how the cognitive constructs of the three different models (Abramson et al., 1989; Beck, 1976; Nolen-Hoeksema & Morrow, 1991) can be integrated in one cognitive model, the second purpose of the studies, different alternatives to integrate the cognitive constructs of the different models were tested in Study 1 and replicated in Study 2. Consistent with theoretical considerations (Nolen-Hoeksema, 1991, 2004; Smith & Alloy, 2009), previous empirical results (Spasojević & Alloy, 2001), and our hypotheses, the results of both studies confirmed that brooding but not reflection influences depressive symptoms, statistically

fulyl mediated by automatic thoughts. Further, both response styles are effected by a negative view of the self and the future but not of the world.

In addition, as proposed by Metalsky and Joiner (1992) and Spangler et al. (1997), all three negative parts of the cognitive triad are associated with inference style. In addition, consistent with Lo et al.'s (2008) and Spasojević and Alloy's (2001) findings, response style is associated with inference style and serves further as full statistical mediator in the association between inference style and depressive symptoms.

The fact that brooding but not reflection is associated with automatic thoughts is consistent with previous studies that found not association of reflection with depressive symptoms and other cognitive constructs (Lo et al., 2008; Treynor et al., 2003). Beyond that, a recent longitudinal study testing the associations between Beck's constructs (1976) measured as one latent variable and the two ruminative response styles brooding and reflection (Pössel, 2010b) found that that Beck's constructs influence brooding while the elimination of reflection increased the model fit. This raises the question what might have contributed to retaining reflection in the presented studies but not in the former study. First, the former study was a longitudinal study while the presented studies are cross-sectional. However, up to now, there is no support for reflection being concurrently but not predictively associated with depressive symptoms and other cognitive constructs (Treynor et al., 2003). Second, in the former study the constructs of Beck's cognitive theory were conceptualized as one latent variable while the same constructs were included as distinguishable in the presented studies. In addition, two of four tested associations of reflection with constructs of Beck's theory proved to be significant. Third, the presented studies included inference style which is significantly associated with reflection as well. Thus, it seems that the more fine-grained test of associations between reflection and

constructs of Beck's model and the inclusion of the hopelessness model (Abramson et al., 1989) allowed to add reflection into the integrated cognitive model. That a negative view of the world is not associated with either of the two response styles in the presented studies might be caused by the fact that none of the RSQ items refers to anything outside of the individual answering the items. Thus, the lack of associations between negative view of the world and response style might be explained by the content of the RSQ items. To test this hypothesis, future research needs to generate additional items measuring the rumination about extra-personal reasons for the depressed mood of the individual.

Finally, while not predicted it is consistent with previous findings that the positive and negative scales of the German CTI do not form a common factor (Pössel, 2009b). However, that the elimination of the positive CTI scales improved the model was unexpected as previous findings found significant correlations between positive CTI scales and depressive symptoms as well as other cognitive constructs (Pössel, 2009b). Nevertheless, it needs to be considered that the correlations of positive CTI scales with depressive symptoms and other cognitive constructs are lower than the same correlations of negative CTI scales (Pössel, 2009b), a pattern that holds up for other cognitive constructs like positive and negative automatic thoughts as well (Pössel, Seemann, & Hautzinger, 2005). Regardless, future research is necessary before the positive view of the self, the world, and the future should be considered unimportant for an integrated cognitive model.

Limitations

The presented findings need to be interpreted with certain limitations in mind. The cross-sectional design of both studies is an important limitation because it does not allow any conclusions about temporal sequence. Thus, the sequential order reported here refers exclusively

to statistical but not temporal mediation effects and future studies with a longitudinal design are needed to test the temporal sequential order.

The sole use of self-report instruments leads to some questions about the validity of the results. In particular, it is questionable how much insight individuals have into the process of their own thinking (e.g., cognitive errors, depressogenic schemata, response style) and it can be argued that this information is outside of our awareness (see Scher, Ingram, & Segal, 2005, for a review). Therefore, information processing paradigms might be better suited than self-report questionnaires when measuring process constructs. In addition, a mono-method bias of using the same informant and method for assessing all constructs in this study is likely. Thus, future studies would benefit from the use of multiple methods (e.g., self-report questionnaires, interview data to measure depressive symptoms, and information processing paradigms) to assess cognitive constructs and depression. Nevertheless, for many of the process constructs, information processing paradigms have not yet been developed (Gotlib & Neubauer, 2000), while self-report instruments are readily available for all measured constructs. Therefore, we decided to use these well-established instruments in our studies.

In addition, not including stress as a factor for the integrating model could be interpreted as a limitation because all three cognitive models can be seen as vulnerability-stress theories. As our goal was to solely focus on the integration of cognitive variables at this time, however, we decided to not include stress into our analyses.

Another limitation are the restrictions resulting from the utilisation of two university samples with the majority of participants being female. The homogeneity of both samples concerning sex, educational level, age range, and social environment may limit the generalizability of the results to general and clinical populations. The limitation to mainly

females participants is important to point out because of the sex difference in depression (Weissman et al., 1996) and of prior research demonstrating opposite patterns of responses on the DAS and CSQ for females and males (Haeffel et al., 2003). As we have not investigated clinical levels of depression with structured diagnostic interviews, it is unclear whether the findings can be generalized to more severe levels of depression. Nevertheless, most research suggests that depression can be seen best as dimensional (e.g., Hankin, Fraley, Lahey, & Waldman, 2005). Thus, it is likely that our results could be replicated in a clinical sample. In addition, using a community sample, our results should be less prone to Berkon's bias and more generalizable when compared with a clinic-referred sample (Cohen & Cohen, 1984). Nonetheless, replication studies with different populations, including clinical samples, would be desirable.

In summary, both studies replicate and extend earlier findings by providing evidence that core cognitive constructs of the three models of depression are distinct from each other while they can be integrated into one model. While the results of both studies found identical associations between the cognitive constructs of different model, our integrated cognitive model needs to be replicated in future studies that overcome limitations of the presented studies (i.e., cross-sectional design, sole use of self-report instruments, no measures of stress, sample restriction to university samples with mainly female participants). If our results can be confirmed, the integrated cognitive model might provide the theoretical framework to better understand how therapeutic techniques derived from one original model influence cognitive variables from another cognitive model. It might even allow for improvements with regard to the effectiveness of psychotherapies for depression by theory-driven combinations of therapeutic techniques that are based on different models.

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Table I

Descriptive Data and Correlations Between All Instruments Used in Study 1.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1.CES-D	.89																	
2.DASp	.42	.87																
3.DASa	.23	.53	.69															
4.CEQ	-.35	-.53	-.39	.87														
5.CTInse	-.54	-.60	-.31	.46	.81													
6.CTInwo	-.48	-.45	-.21	.36	.56	.68												
7.CTInfu	-.49	-.42	-.25	.34	.44	.31	.63											
8.CTIpse	-.38	-.42	-.18	.29	.55	.26	.33	.77										
9.CTIpwo	-.32	-.27	-.06	.19	.42	.34	.21	.38	.50									
10.CTIpfu	-.33	-.32	-.08	.24	.33	.23	.43	.45	.47	.68								
11.ATQ	.75	.49	.27	-.40	-.66	-.49	-.48	-.36	-.30	-.33	.89							
12.CSQie	.11	.25	.16	-.21	-.26	-.11	-.10	-.28	.02	-.01	.13	.75						
13.CSQgs	.32	.41	.30	-.38	-.39	-.28	-.30	-.23	-.17	-.09	.35	.29	.91					

14.CSQsu	.12	.18	.24	-.19	-.23	-.13	-.15	-.11	-.03	-.02	.18	.23	.44	.84				
15.CSQco	.36	.48	.36	-.45	-.40	-.38	-.37	-.21	-.18	-.17	.37	.13	.68	.26	.91			
16.CSQse	.35	.47	.34	-.47		-.44	-.37	-.30	-.32	-.20	.37	.17	.56	.22	.66	.92		
17.RSQb	.28	.37	.31	-.38	-.12	-.03	.08	-.05	.02	.07	.36	.16	.24	.10	.24	.32	.59	
18.RSQr	-.03	.06	.09	-.13	-.44	-.25	-.16	-.24	-.14	-.06	.04	.06	.11	.09	.10	.20	.39	.70
Mean	35.05	23.99	31.48	99.90	34.24	25.99	26.77	22.15	27.36	23.35	20.50	46.63	37.65	44.92	29.60	26.61	2.48	2.30
SD	9.15	11.58	8.12	11.31	5.56	4.76	3.40	3.47	3.75	3.82	8.01	7.89	10.80	12.04	11.34	11.83	0.61	0.75

Note. N = 561 for all variables. Values in the diagonal represent Cronbach's Alpha. CES-D = Center for Epidemiological Studies – Depression Scale; DASp = Dysfunctional Attitudes Scale, performance evaluation; DASa = Dysfunctional Attitudes Scale, approval by others; CEQ = Cognitive Error Questionnaire total score; CTInse = Cognitive Triad Inventory, negative view of self; CTInwo = Cognitive Triad Inventory, negative view of world; CTInfu = Cognitive Triad Inventory, negative view of future; CTIpse = Cognitive Triad Inventory, positive view of self; CTIpwo = Cognitive Triad Inventory, positive view of world; CTIpfu = Cognitive Triad Inventory, positive view of future; ATQ = Automatic Thoughts Questionnaire, negative self-statements; CSQie = Cognitive Style Questionnaire, negative events intrinsic-extrinsic; CSQgs = Cognitive Style Questionnaire, negative events general-specific; CSQsu = Cognitive Style Questionnaire, negative events stable/unstable; CSQco = Cognitive Style Questionnaire, negative events consequences; CSQse = Cognitive Style Questionnaire, negative events self; RSQb = Response styles Questionnaire, brooding; RSQr = Response styles Questionnaire, reflection. All correlations ≥ .09 are significant at $p < .05$.

Table II

Descriptive Data and Correlations Between All Instruments Used in Study 2.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.
1.CES-D	.92																	
2.DASp	.39	.89																
3.DASa	.22	.50	.75															
4.CEQ	-.32	-.62	-.36	.88														
5.CTInse	-.54	-.63	-.28	.55	.84													
6.CTInwo	-.47	-.47	-.16	.39	.60	.61												
7.CTInfu	-.50	-.45	-.23	.36	.58	.51	.59											
8.CTIpse	-.43	-.50	-.18	.43	.69	.34	.42	.80										
9.CTIpwo	-.38	-.44	-.08	.34	.46	.47	.45	.43	.50									
10.CTIpfu	-.44	-.39	-.14	.32	.52	.33	.54	.59	.49	.71								
11.ATQ	.79	.48	.26	-.45	-.65	-.52	-.56	-.42	-.41	-.41	.90							
12.CSQie	.18	.29	.20	-.32	-.37	-.13	-.13	-.36	-.12	-.19	.25	.73						
13.CSQgs	.35	.39	.23	-.31	-.46	-.38	-.27	-.32	-.29	-.24	.43	.44	.83					

14.CSQsu	.18	.28	.17	-.29	-.30	-.23	-.16	-.25	-.23	-.21	.26	.47	.62	.85				
15.CSQco	.33	.38	.21	-.32	-.43	-.39	-.29	-.29	-.29	-.22	.42	.36	.77	.52	.90			
16.CSQse	.37	.53	.34	-.51	-.53	-.31	-.36	-.41	-.27	-.29	.49	.47	.61	.45	.62	.93		
17.RSQb	.25	.28	.27	-.39	-.31	-.24	-.14	-.15	-.11	-.08	.37	.24	.21	.17	.19	.32	.59	
18.RSQr	.18	.10	.09	-.09	-.08	-.17	-.04	.02	-.08	-.03	.22	.04	.16	.21	.16	.18	.38	.74
Mean	36.37	27.55	33.70	96.40	33.10	24.74	25.63	21.88	26.62	26.82	23.44	46.02	36.54	42.27	32.47	30.26	2.46	2.52
SD	10.74	13.39	8.57	13.09	6.46	4.59	4.02	3.83	3.97	4.23	9.05	8.36	9.95	10.23	11.41	13.57	0.73	0.66

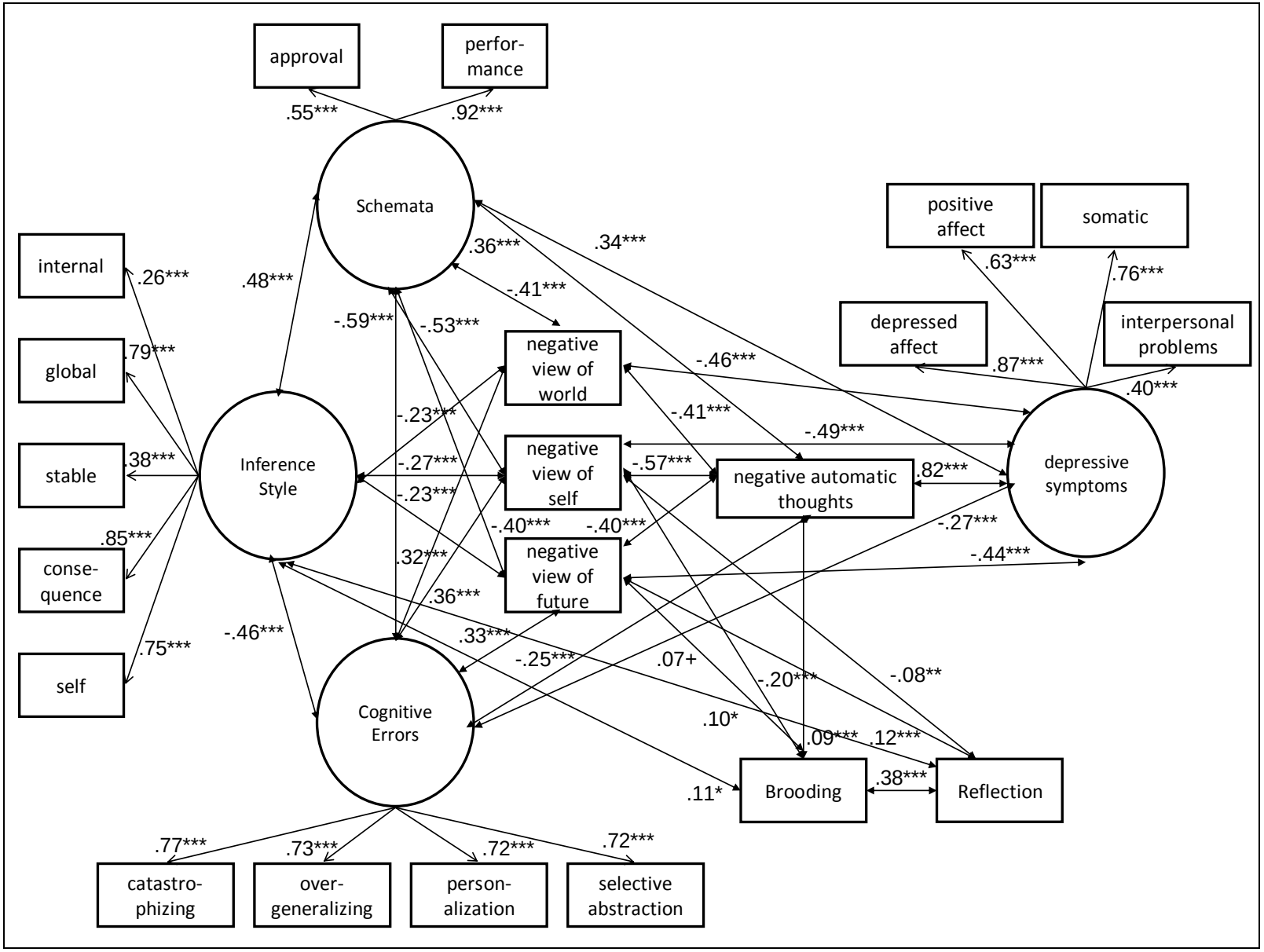
Note. N = 450 for all variables. Values in the diagonal represent Cronbach's Alpha. CES-D = Center for Epidemiological Studies – Depression Scale; DASp = Dysfunctional Attitudes Scale, performance evaluation; DASa = Dysfunctional Attitudes Scale, approval by others; CEQ = Cognitive Error Questionnaire total score; CTInse = Cognitive Triad Inventory, negative view of self; CTInwo = Cognitive Triad Inventory, negative view of world; CTInfu = Cognitive Triad Inventory, negative view of future; CTIpse = Cognitive Triad Inventory, positive view of self; CTIpwo = Cognitive Triad Inventory, positive view of world; CTIpfu = Cognitive Triad Inventory, positive view of future; ATQ = Automatic Thoughts Questionnaire, negative self-statements; CSQie = Cognitive Style Questionnaire, negative events intrinsic-extrinsic; CSQgs = Cognitive Style Questionnaire, negative events general-specific; CSQsu = Cognitive Style Questionnaire, negative events stable/unstable; CSQco = Cognitive Style Questionnaire, negative events consequences; CSQse = Cognitive Style Questionnaire, negative events self; RSQb = Response styles Questionnaire, brooding; RSQr = Response styles Questionnaire, reflection. All correlations ≥ .09 are significant at $p < .05$.

Figure 1

The final integrated cognitive model of depression in Study 1.

Figure 2

The final integrated cognitive model of depression in Study 2.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quence
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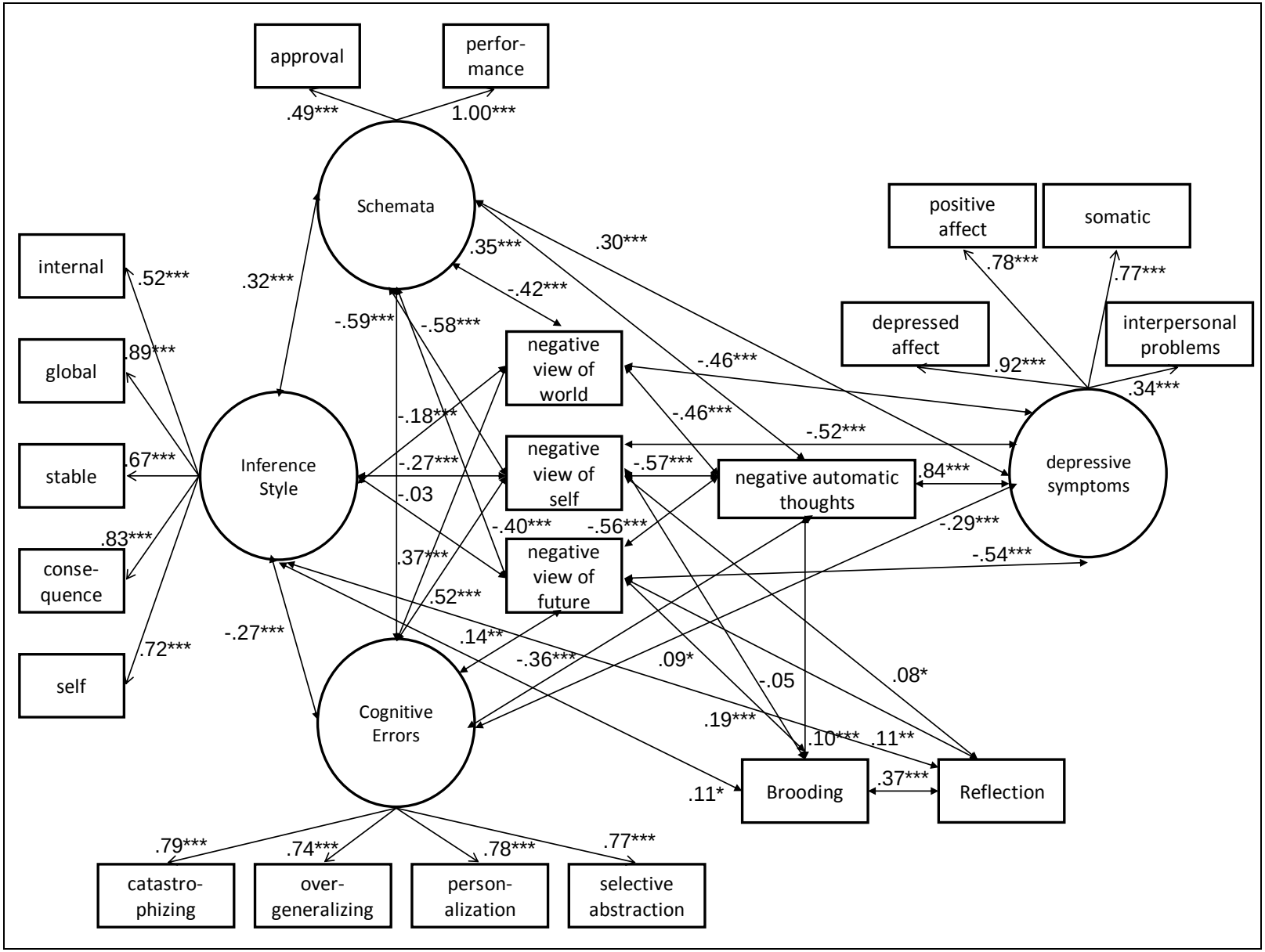
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negative view of world
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Cognitive Errors
positive affect
somatic
.78***
.77***
depressed affect
interpersonal problems
.92***
.34***
-.46***
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negative automatic thoughts
.84***
depressive symptoms
-.29***
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Brooding
.37***
Reflection
.79***
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catastro-phizing
over-generalizing
person-alization
selective abstraction